

**SYSTEMATIC STUDY ON COLLEMBOLA (INSECTA) FROM
THAILAND, I. EIGHT NEW SPECIES OF
DICRANOCENTROIDES (PARONELLIDAE) AND
LEPIDOCYRTUS (ENTOMOBRYIDAE)**

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ABSTRACT

This paper describes 8 new species including 5 *Dicranocentroides* (Paronellidae) and 3 *Lepidocyrtus* (Entomobryidae) species from 12 localities of Thailand. They are as follows: *Dicranocentroides orientalis* Kim and Rojanavongse n. sp., *D. nigroventris* Kim and Rojanavongse n. sp., *D. thaius* Kim and Rojanavongse n. sp., *D. nigronotus* Kim and Rojanavongse n. sp., *D. marginatus* Kim and Rojanavongse n. sp., *Lepidocyrtus (Ascocyrtus) simplex* Park and Rojanavongse n. sp., *Lepidocyrtus (A.) minimus* Park and Rojanavongse n. sp. and *Lepidocyrtus (A.) reductus* Park and Rojanavongse n. sp. This study adds 8 species to the existing record of 7 species on these two genera from Thailand.

Key words: *Dicranocentroides*, *Lepidocyrtus*, Paronellidae, Entomobryidae, Collembola, Insecta, Thailand, Taxonomy, New species

INTRODUCTION

Thailand, 513,115 km² in area, extends north to south between 6° and 20° latitude, and is divided into 6 regions: the Northern Highlands, the Korat Plateau, the Central Plain, the Southeast Uplands, the Tenasserin Hills and the Southern Peninsula. It thus covers subtropical, alpine and plain habitats in the north and middle as well as tropical rain forests in the far south. The wide longitudinal range provides a large variety of ecological habitats which have led to a high biological diversity in the course of evolution.

In contrast to the high diversity of vertebrates reported in Thailand, there has been relatively little work done on terrestrial insects. So far around 7,000 species have been listed, which accounts for the number derived from only 10% of insect collections at the Department of Agriculture (OEPP, 1995). Much higher numbers are to be expected from the remaining 90% of the collections.

As far as soil fauna is concerned it was in the 1960s that differences in faunistic composition and biomass in varying types of forests (Deciduous Dipterocarp, Dry Evergreen, Tropical Evergreen, Hill Evergreen, Mixed Deciduous, Pine) were found (WATANABE ET AL., 1966). Later, an extensive study by WATANABE & SAICHUAE (1967) demonstrated the relations between soil animals and soil water content, inorganic soil composition and

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Figure 1. Collection localities of Collembola (Insecta) from Thailand. 1. Khao Chong (Trang); 2. Mt. Wangnamtau (Surat Thani); 3. Khao Sok (Surat Thani); 4. Khao Sam Roi Yot (Prachuap Khiri Khan); 5. Kang Krachan (Petchaburi); 6. Khao Chamao (Rayong); 7. Bangkok; 8. Kanchanaburi; 9. Khao Yai (Nakhon Ratchasima); 10. Phu Kae (Saraburi); 11. Si Savat (Kanchanaburi); 12. Sakaerat (Nakhon Ratchasima); 13. Nakhon Ratchasima (Nakhon Ratchasima); 14. Huai Yai (Sakon Nakorn); 15. Phu Phan (Sakhon Nakhon); 16. Nakhon Phanom (Nakhon Panom); 17. Doi Inthanon (Chiang Mai); 18. Chiang Mai; 19. Mae Hong Son; 20. Chiang Dao (Chiang Mai); 21. Mae Sai (Chiang Rai).
 ★ : collection localities prior to the present study
 ● : collection localities in the present study

other environmental factors in forest ecosystems in northeastern and southern parts of Thailand. A dozen years later, the effects of shifting cultivation on Collembolan populations in forests of the Northeast were documented by TAKEDA (1981).

Collembolan taxonomy was not studied in Thailand until the first report by YOSII (1961). Since then there have been works on several families, including Neanuridae (BEDOS & DEHARVENG, 1990, 1991; DEHARVENG, 1987, 1989, 1991; DEHARVENG & BEDOS, 1992, 1993), Hypogastruridae (DEHARVENG & BROUGEOIS, 1991), Entomobryidae and Paronellidae of Arthropleona (DEHARVENG, 1988, 1990; DEHARVENG & GERS, 1993; YOSII, 1985), and on Sminthuridae of Symphypleona (NAYROLLES, 1990), so that the known Thai Collembola now include a total of 129 species in 26 genera and 5 families. A review of the diversity of Collembola from northern Thailand was made by DEHARVENG *ET AL.* (1989) and DEHARVENG & BEDOS (1993), who investigated the relationship between Collembolan diversity and heterogeneity of the soil habitat and trophic niches. Most of these systematic studies on Collembola, however, were done primarily on groups from northern Thailand.

The present study deals with families Paronellidae and Entomobryidae collected over the last 3 years from 12 localities in the northeast, central Thailand and south Thailand.

Holotypes and some paratypes will be deposited in the collection of the Faculty of Biological Sciences of Chonbuk National University in Chonju, Korea, and some paratypes in the Department of Entomology in Kasetsart University, Bangkok, Thailand.

MATERIALS AND METHODS

Collembola specimens were collected from twelve localities of Thailand, mainly in northeastern, central plain, and southern areas (Fig. 1).

We used either aspirators for direct collection or Tullgren apparatus for extracting specimens. Collembola then were fixed in 90% ethanol. For clearing and preparing slides, we used Marc André I and II solution (MASSOUD, 1967). Sometimes 10% KOH solution was used for rapid decoloration. The specimens were examined under optic microscope for identification. For preparing permanent slides glycyl was put along the coverglass edge to prevent drying of the slide-mounting medium.

RESULTS

We identified 8 new species of Collembola, including 5 *Dicranocentroides* spp. (Paronellidae) and 3 *Lepidocyrtus* spp. (Entomobryidae), as follows.

Family Paronellidae

Dicranocentroides orientalis Kim and Rojanavongse n. sp.

Dicranocentroides nigroventris Kim and Rojanavongse n. sp.

Dicranocentroides thaius Kim and Rojanavongse n. sp.

Dicranocentroides nigronotus Kim and Rojanavongse n. sp.

Dicranocentroides marginatus Kim and Rojanavongse n. sp.

Family Entomobryidae

Lepidocyrtus (Ascocyrtus) simplex Park and Rojanavongse n. sp.*Lepidocyrtus (Ascocyrtus) minimus* Park and Rojanavongse n. sp.*Lepidocyrtus (Ascocyrtus) reductus* Park and Rojanavongse n. sp.

Family Paronellidae

***Dicranocentroides orientalis* Kim and Rojanavongse n. sp. (Fig. 2)**

Body length up to 5.0 mm. Dark brown color living and in alcohol. Head, posterior part of tergites more darkly pigmented (Fig. 2A). Body covered with dark colored scales (Fig. 2F). Antenna polychaetotic as like a brush in Antenna I, II segments, and 4-segmented (Fig. 2B). Antennal segments I:II:III:IV ratio as 5:8:6:8. Antenna:head ratio as 27:8. Vertex group of head complete (Fig. 2C). Eyes 8+8, in 2 rows (Fig. 2C), with dark eye patch, covered with small granules. Postantennal organ (PAO) absent. Labrum 4/5,5,4. Prelabral setae simple and smooth (Fig. 2D). The median setae of the first row simple, unmodified. Labial ramus with simple and smooth seta on a papilla (Fig. 2E). Trochanteral organ with ca. 60 setae (Fig. 2G). Tibiotarsus with four types of setae (Fig. 2H). Claw with one triangular head broadened tenent hair (Fig. 2I). Unguis with 2 inner teeth, one pair of lateral teeth (Fig. 2I). Unguiculus smooth, toothless lancet form (Fig. 2I). Ventral tube with 30+30 setae on lateral flap. Tenaculum quadridentated, with one blunt median seta (Fig. 2J). Furca unscaled. Mn.:Dn.:Mc. ratio 8:11:0.6. Dens consists of three kinds of setae, without terminal vesicle. Mucro multidentated, with 6 teeth (Fig. 2K). Chaetotaxy of Abd. II segment with s/9/s/5, Abd. III with 2/s. Abd. IV with median group of ca. 16+16 setae of two levels and posterior group with 12+12 (Fig. 2L).

Type data.—Holotype ♂, Mt. Wang Nam Tau (Surat Thani), at alt. 300 m, from fallen leaves of the sandy soil in evergreen forest. 12.II.95. Paratypes 8, Kaeng Krachan National Park (Petchaburi) at alt. 250 m, from sandy soil and fallen leaves of evergreen forests. 21. VIII.97, same data as holotype.

Etymology.—The name *orientalis* means this species has the distribution restricted to Oriental Region.

Remarks.—This species is closely related to *Dicranocentroides coomani* Delamare, 1948, from Thailand and Vietnam in Ant. I, II polychaetotic like a brush. But it is differentiated by color pattern of Abd. IV-VI, chaetotaxy of tergites, mucro teeth of the cited species.

***Dicranocentroides nigroventris* Kim and Rojanavongse n. sp. (Fig. 3)**

Body length up to 3.5 mm. Body with light brownish color except for Abd. III and IV segments with deeper pigments on the ventro-lateral sides alive and in alcohol (Fig. 3A). Body with cylindrical shape; Antenna covered with scales. Antenna I, II segments thicker, with many macrosetae (Fig. 3A). Body with numerous macrosetae on dorsal side, with hyaline and fusiform scales. Antennal segments I:II:III:IV ratio as 7:8:5:8. Antenna:head ratio as 4:1. Head with 4+4 frontal group (Fig. 2B) and v-group incomplete, without

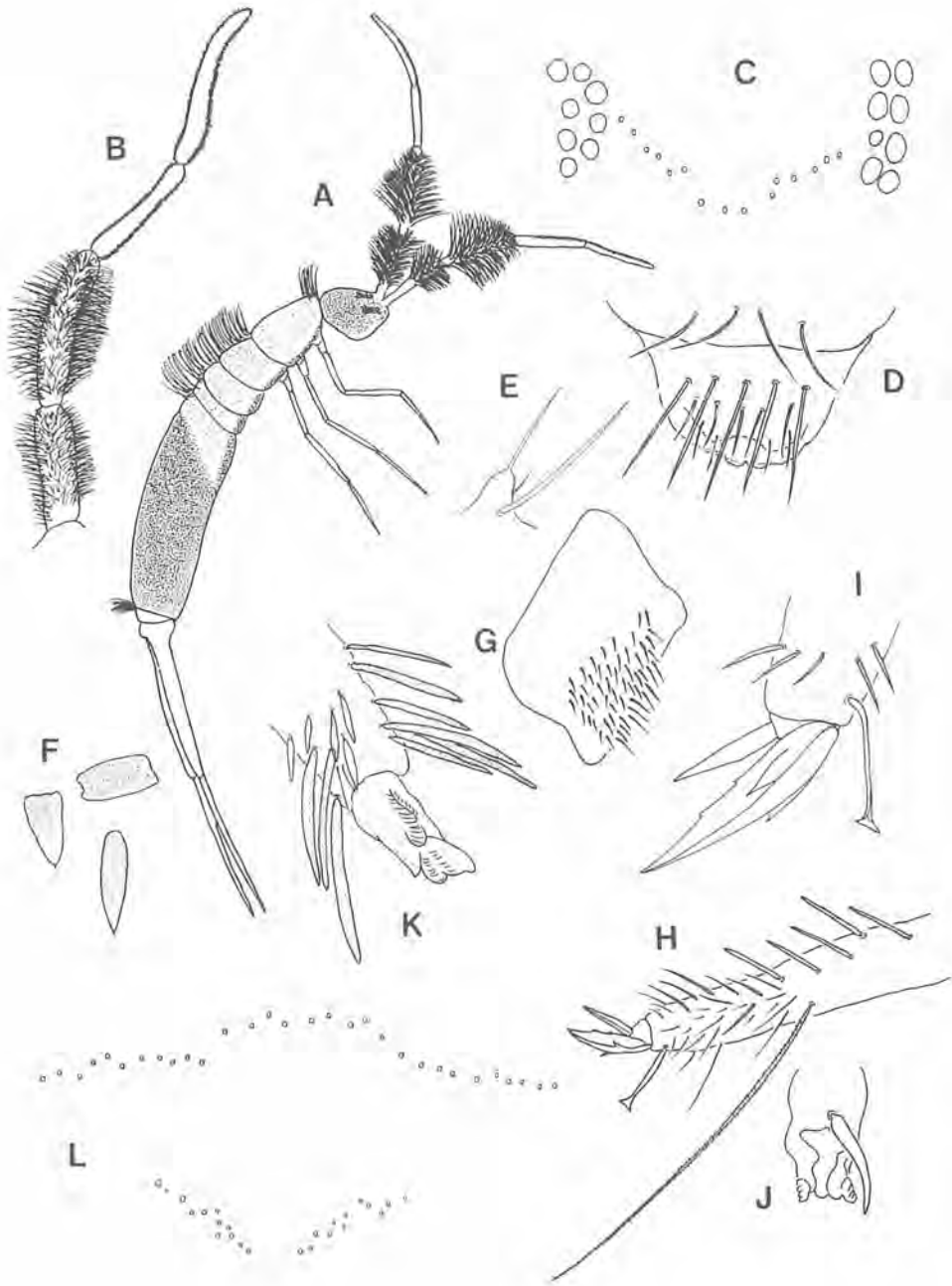


Figure 2. *Dicranocentroides orientalis* Kim and Rojanavongse n. sp. A. habitus; B. antenna; C. eyes and γ -group of head; D. labrum; E. maxillary ramus; F. scales of tergites; G. trochanteral organ; H, I. claw, unguis and unguiculus; J. tenaculum; K. mucro; L. chaetotaxy of Abd. IV.

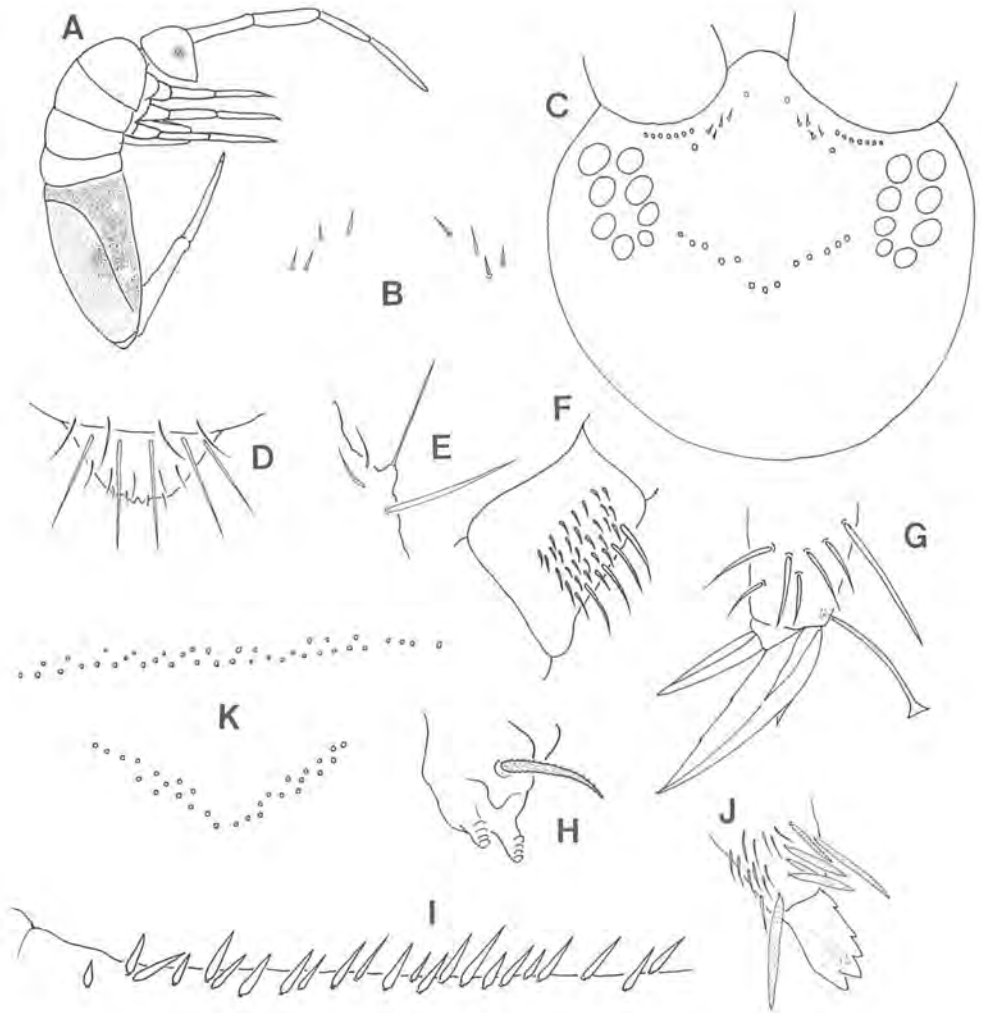


Figure 3. *Dicranacentroides nigroventris* Kim and Rojanavongse n. sp. A. habitus; B. frontal group of head; C. eyes and v-group of head; D. labrum; E. maxillary ramus; F. trochanteral organ; G. unguis and unguiculus; H. tenaculum; I. spine-like setae of dens; J. mucro; K. chaetotaxy of Abd. IV.

V_7 (Fig. 3C). Eyes 8+8, in 2 rows and with eye patch (Fig. 3C). Postantennal organ (PAO) absent. Labrum 4/5,5,4 (Fig. 3D). Prelabral setae simple, smooth. The median setae of the first row of labrum unmodified, smooth. Labial ramus with simple, smooth seta (Fig. 3E). Trochanteral organ composed of ca. 37 setae, outer margin with 4 longer setae (Fig. 3F). Claw with one tenent hair, with head, triangular and broad in shape (Fig. 3G). Unguis carinated, with 2 inner teeth, one pair of lateral teeth (Fig. 3G). Unguiculus lancet form (Fig. 3G). Ventral tube unscaled. Tenaculum quadridentate rami, with one brownish and barbed blunt median seta (Fig. 3H). Furca unscaled. Mn.:Dn.:Mc. ratio as 10:8:0.3. Dens with 23 dental spines on each side (Fig. 3I). Mucro multidentated, with 2 apical teeth, 2 subapical teeth (Fig. 3J). Chaetotaxy of Abd. II segment with s/10/s/5. Abd. III with 2/s/s. Abd. IV median group with ca. 19+19, with one level and posterior group with 14+14 (Fig. 3K).

Type data.—Holotype ♂, Khao Yai National Park (Nakorn Ratchasima), at alt. 720 m, from fallen leaves near stream of Kong Kaew waterfall in evergreen forest. 21.III.95. Paratypes 3, Kaeng Krachan National Park (Petchaburi), at alt. 250 m, from fallen leaves of the evergreen forests. 21.VI.95, same data as holotype.

Etymology.—The name *nigroventris* is derived from dark pigments of abdomen.

Remarks.—This species is similar to *Dicranocentroides clitellatus* YOSII, 1982 from Malaya by sharing the same Abd. II with lateral setae. But it is differentiated by antenna and Abd. III with transverse band in the cited species.

***Dicranocentroides thaius* Kim and Rojanavongse n.sp.**

(Fig. 4)

Body length up to 3.2 mm. Brownish color in alcohol. From Th. III to Abd. II segments and tibiotarsus pale. Abd. IV with longitudinal stripes (Fig. 4A). Antennal segments I, II stout and thicker than other segments, with yellowish color and polychaetotic like a brush. Antenna segments III and IV with linear pigment on ventral side. Antenna IV without apical lobe. Antenna:head ratio as 5:1. Vertex group of head incomplete, without V_2 (Fig. 4B). Eyes 8+8, in 2 rows, with eye patch (Fig. 4C). Postantennal organ (PAO) absent. Labrum 4/5,5,4 (Fig. 4D). Prelabral setae simple, median 3 setae of the first row of labrum unmodified, acuted and no longer than lateral pair. Trochanteral organ with ca. 35 setae (Fig. 4E). Claw with one tenent hair, with head, triangular and broad in shape (Fig. 4F). Unguis with 2 inner teeth, one pair of lateral teeth (Fig. 4F). Unguiculus lancet form, reach to 4/5 of inner side of unguis (Fig. 4F). Ventral tube unscaled, 3+3 macrosetae on anterior side, 20+20 setae on lateral flap. Tenaculum quadridentate rami, with one median seta, brownish, barbed and blunt (Fig. 4J). Furcula pale. Mn.:Dn.:Mc. ratio as 8:10:0.3. Manubrium and dens with a number of setae. Mucro multidentated, with 6 teeth (Fig. 4G). Chaetotaxy of Abd. II segment with s/7/s/3, Abd. III with 1/s (Fig. 4H). Abd. IV median group with ca. 17+17 setae in a transversal row and posterior group with 5+5 (Fig. 4I).

Type data.—Holotype ♂, Khao Yai National Park (Nakhon Ratchasima), from fallen leaves near the stream of Haew Suwat waterfall, at alt. 620 m, in evergreen forest. 19.VIII.97. Paratypes 3, same data as holotype.

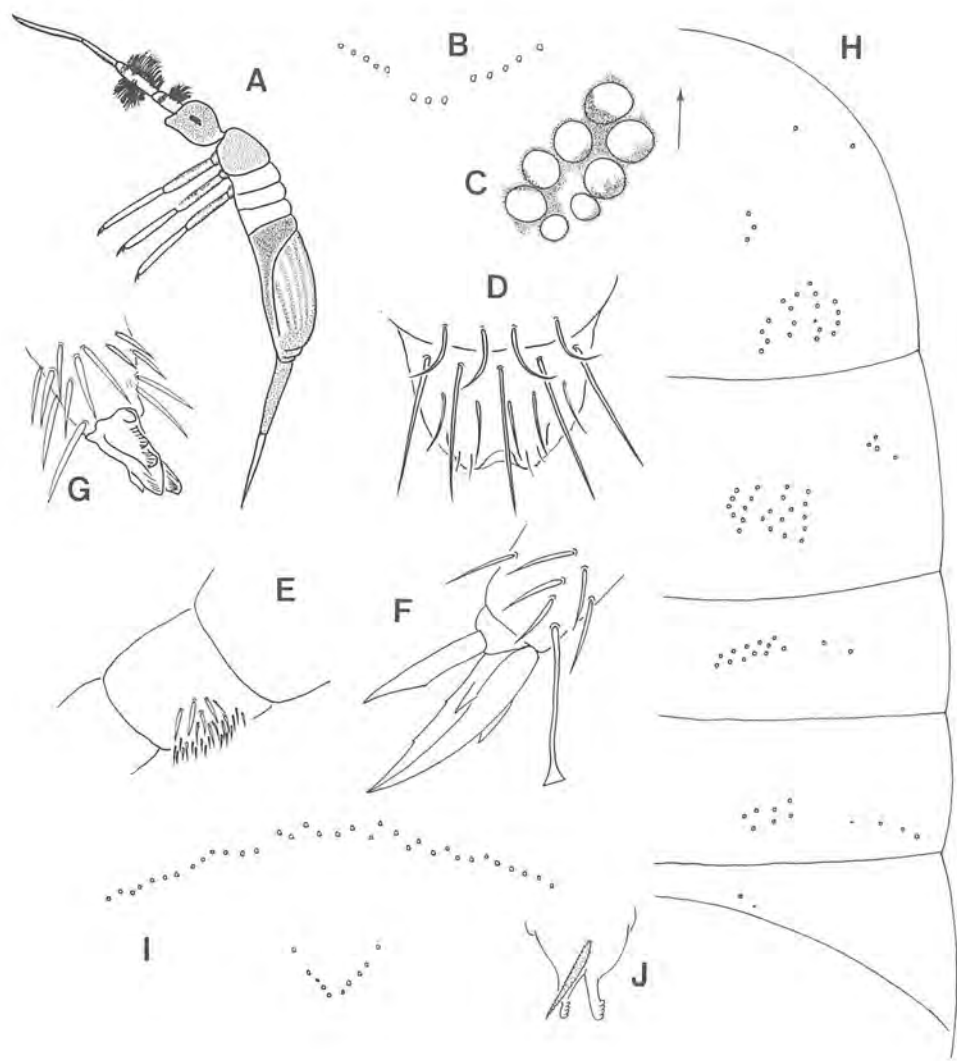


Figure 4. *Dicranocentroides thaius* Kim and Rojanavongse n. sp. A. habitus; B. vertex group of head; C. eyes and eye patch; D. labrum; E. trochanteral organ; F. unguis and unguiculus; G. mucro; H. chaetotaxy of tergites; I. chaetotaxy of Abd. IV; J. tenaculum.

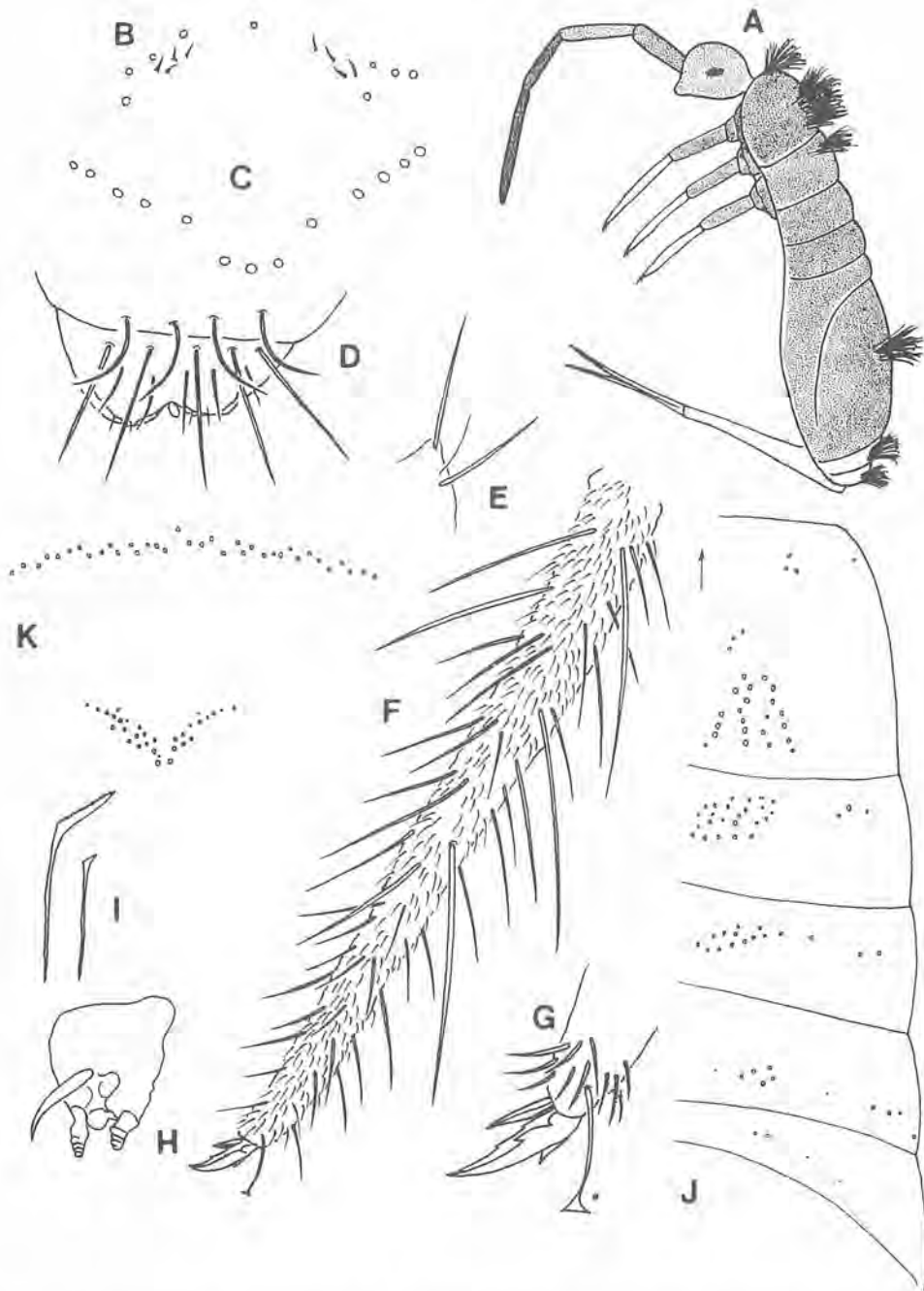


Figure 5. *Dicranocentroides nigronotus* Kim and Rojanavongse n. sp. A. habitus; B. frontal group of head; C. vertex group of head; D. labrum; E. maxillary ramus; F. tibiotarsus of hind leg; G. unguis and unguiculus; H. tenaculum; I. macrosetae of tergites; J. chaetotaxy of tergites; K. chaetotaxy of Abd. IV.

Etymology.—The name *thaius* is derived from the wide distribution of this species in Thailand.

Remarks.—This species is concordant to *Dicranocentroides brevicornis* (YOSII, 1956) from Malaya, but it is differentiated by its antennae, band pattern of tergites, and chaetotaxy of the cited species. This species is characterized by Abd. IV segment with longitudinal stripes on the dorsal side.

***Dicranocentroides nigronotus* Kim and Rojanavongse n.sp. (Fig. 5)**

Body length up to 2.8 mm. Gray color alive and in alcohol (Fig. 5A). Body polychaetotic, covered with round, colored scales. Macrosetae on anterior body spatulate (Fig. 5I), but posterior part with blunt setae. Antenna 4-segmented, I and II segments scaled, with blunt macrosetae (Fig. 5A). Antennal segments I:II:III:IV ratio as 5:6:5:8. Antenna:head ratio as 27:5. Frontal group of head with 4+4 spiny setae (Fig. 5B) and v-group incomplete, without V_3 (Fig. 5C). Eyes 8+8, in 2 rows, G, H smaller than others, with eye patch. Postantennal organ (PAO) absent. Labrum 4/5,5,4 (Fig. 5D), with simple and smooth setae. Prelabral setae simple. The median setae of the first row of labrum unmodified and same length. Labial ramus with simple and acute seta (Fig. 5E). Femur with deep-pigmented, tibiotarsus scaled, with long, simple setae on lateral side (Fig. 5F). Claw with one tenent hair, with head, triangular and broad in shape (Fig. 5G). Unguis with 2 inner teeth, one pair of lateral teeth (Fig. 5G). Unguiculus lancet form (Fig. 5G). Tenaculum quadridentate rami, with one blunt median seta (Fig. 5H). Furcula unscaled. Mn.:Dn.:Mc. ratio as 7:9:0.3. Mucro multidentated. Chaetotaxy of Abd. II segment with s/5/s/4. Abd. III with 2/s (Fig. 5J). Abd. IV median group with ca. 18+18 setae in a row and posterior group with 13+13 (Fig. 5K).

Type data.—Holotype♂, Mt. Wang Nam Tau (Surat Thani), at alt. 300 m, from fallen leaves in evergreen forest. 12.II.95. Paratypes 5, same data as holotype.

Etymology.—The name *nigronotus* is derived from dark pigments on the thorax in this new species.

Remarks.—This species is related to *Dicranocentroides malayanus* YOSII, 1981 from Malaya. But it is differentiated by chaetotaxy, and band pattern of the cited species.

***Dicranocentroides marginatus* Kim and Rojanavongse n. sp. (Fig. 6)**

Body length up to 3.1 mm. Brownish color in alcohol. Body cylindrical in shape, spot on vertex. Antenna scaled. I, II segments thicker than others, with a band on each proximally. Abd. III segment with transverse band on dorsal side (Fig. 6A). Antennal segments I:II:III:IV ratio as 8:10:7:8. Antenna IV without apical lobe. Antenna:head ratio as 29:7. Frontal group of head with 4+4 spiny setae, v-group incomplete without V_2 (Fig. 6B). Eyes 8+8, in 2 rows, G, H smaller than others and with eye patch (Fig. 6C). Postantennal organ (PAO) absent. Labrum 4/5,5,4 (Fig. 6D). Prelabral setae simple, median setae of the first row of labrum unmodified, smooth. Marginal region without process. Maxillary ramus with simple long seta on process, one smooth seta (Fig. 6E). Trochanteral organ with 45 setae. Claw with one tenent hair, with head, triangular and broad in shape

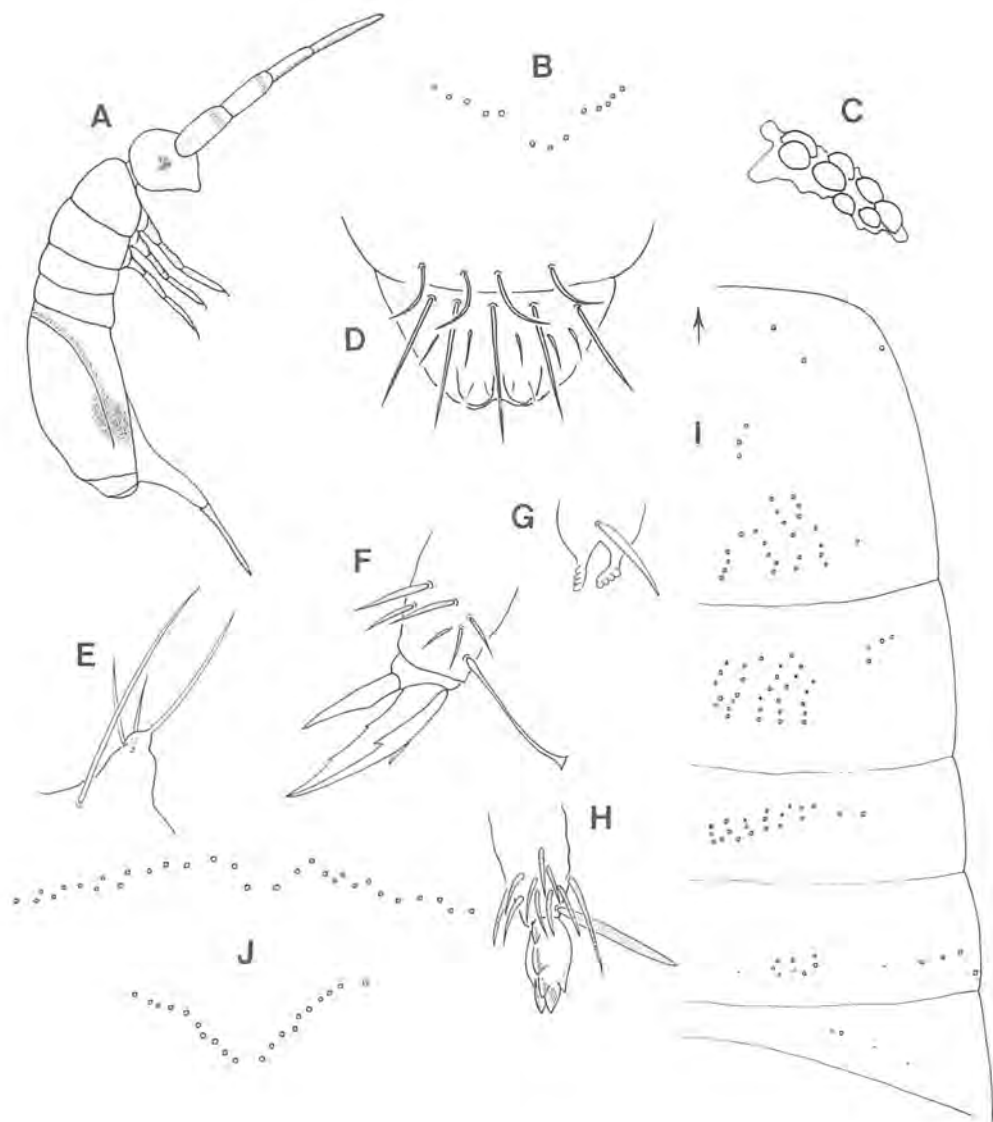


Figure 6. *Dicranocentroides marginatus* Kim and Rojanavongse n. sp. A. habitus; B. vertex group of head; C. eyes; D. labrum; E. maxillary ramus; F. unguis and unguiculus; G. tenaculum; H. mucro; I. chaetotaxy of tergites; J. chaetotaxy of Abd. IV.

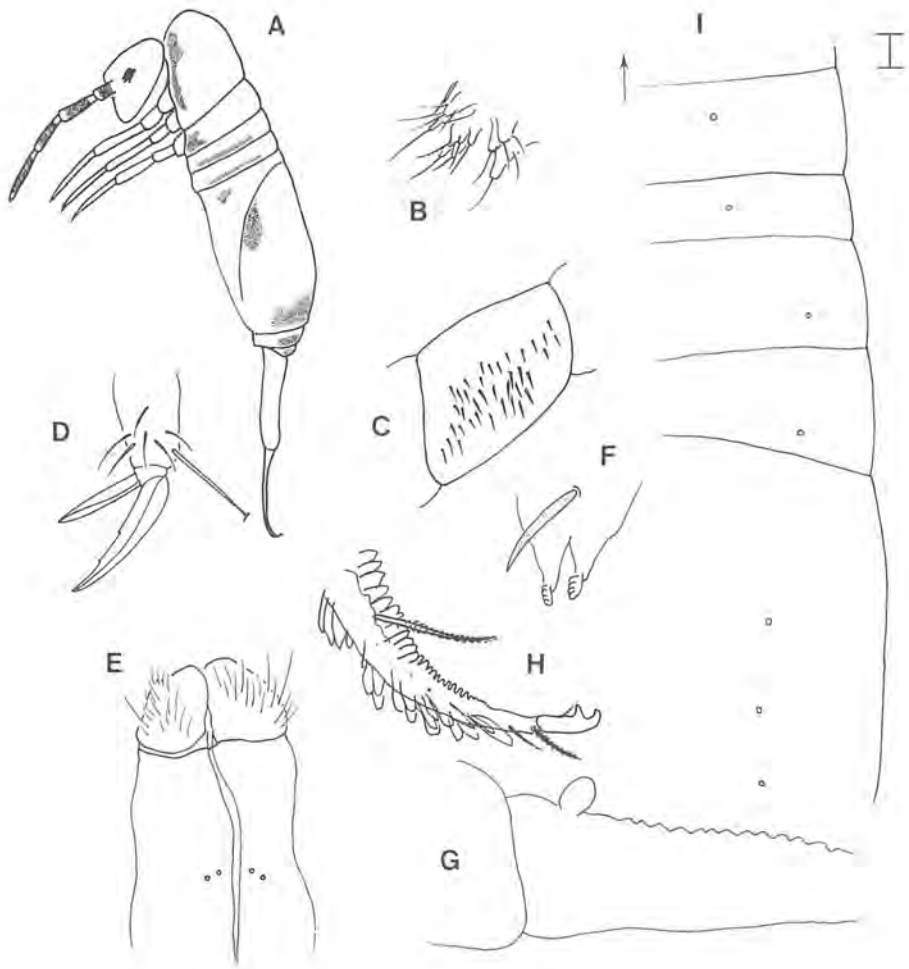


Figure 7. *Lepidocyrtus (Ascocyrtus) simplex* Park and Rojanavongse n. sp. A. habitus; B. maxillary ramus; C. trochanteral organ; D. unguis and unguiculus; E. lateral side of ventral tube; F. tenaculum; G. dorsal vesicle of dens; H. mucro and proximal part of dens; I. chaetotaxy of tergites.

(Fig. 6F). Unguis carinated, with 2 inner teeth, one pair of lateral teeth (Fig. 6F). Unguiculus lancet form (Fig. 6F). Tenaculum quadridentate rami, with one blunt curved median seta (Fig. 6G). Furca pale. Mn.:Dn.:Mc. ratio as 8:10:0.3. Manubrium with 2+2 setae on basal part. Dens with dental spines. Mucro multidentated, with one apical tooth, one subapical tooth, one lateral tooth, 2 intermediate teeth and one basal tooth (Fig. 6H). Chaetotaxy of Abd. II with s/8/s/4. Abd. III 2/s (Fig. 6I). Abd. IV median group with ca. 17+17 setae in a row and posterior group with 10+10 (Fig. 6J).

Type data.—Holotype ♂, Kaeng Krachan National Park (Petchaburi), at alt. 250 m, from surface soil of dried swamp in the evergreen forest. 21.VI.95, Paratypes 7, same data as holotype.

Additional materials: 3, from Kaeng Krachan (Petchaburi), at alt. 250 m, from fallen leaves near stream in evergreen forest. 21.VI.95.

Etymology.—The name *marginatus* is derived from the posterior band on Abd. III segment.

Remarks.—This species is related to *Dicranocentroides clitellatus* YOSII, 1982 from Malaya by Abd. III with transverse band and chaetotaxy. It is differentiated by Ant. IV segment patch and chaetotaxy of the cited species.

Family Entomobryidae

Lepidocyrtus (Ascocyrtus) simplex Park and Rojanavongse n.sp. (Fig. 7)

Body length up to 2.0 mm, covered with hyaline and round scales. Antenna and lateral sides of Thorax II, III segments pigmented. Abd. I, II with transverse band on lateral side. Abd. III with spot on lateral side. Abd. IV, V, VI with pigments on dorsal side (Fig. 7A). Th. II slightly protruded. Body covered with scales. Antenna 4-segmented, with pigment. Each segments ratio as 1:2:2:3. Antennal segments I, II with scales on dorsal side. Antenna IV without apical lobe. Antenna:head ratio as 2:1. Eyes 8+8, with eye patch. Labrum 4/5,5,4. Prelabral setae barbed, marginal region with 4 transverse tubercles. Maxillary rami consists of acute setae on papillae (Fig. 7B). Trochanteral organ with ca. 45 setae (Fig. 7C). Claw with one tenent hair, with head, triangular and broad in shape (Fig. 7D). Unguis slender, with 2 inner teeth (Fig. 7D). Unguiculus lancet form (Fig. 7D). Ventral tube with terminal tubules, 2+2 macrosetae on anterior side and with 23 setae on lateral flap (Fig. 7E). Tenaculum quadridentated, with one basal seta (Fig. 7F). Furcula pale. Mn.:Dn.:Mc. ratio as 6:5:0.5. Dens crenulated on posterior side, with one prominent dorsal appendix (Fig. 7G). Mucro bidentated, with one small basal seta (Fig. 7H).

Type data.—Holotype ♂, Mt. Wang Nam Tau (Surat Thani), at alt. 300 m, from fallen leaves in evergreen forest. 12.II.95. Paratypes 2, same data as holotype.

Etymology.—The name *simplex* is derived from protruded thorax shape of this genus.

Remarks.—This species is concordant to *Lepidocyrtus (As.) medius* Shaffer, 1898 from Thailand in antenna pigment. Also it is related to *L. (As.) aseanus* YOSII, 1982 from Vietnam by sharing ventral tube unscaled and antenna without apical bulb. It is differentiated by chaetotaxy of tergites of the cited species.

***Lepidocyrtus (Ascocyrtus) minimus* Park and Rojanavongse n.sp. (Fig. 8)**

Body length up to 1.3 mm. White color in alcohol. Body covered with hyaline, fusiform scales. Body setae small. Thorax II segment protruded slightly. With scattered pigments on lateral side of Th. III, Abd. I and transverse band on dorsal side of Abd. IV (Fig. 8A). Antenna short, 4-segmented, ratio as 1:2:2:3. Antenna: head ratio as 3:2. Eyes 8+8, with eye patch (Fig. 8B). Labrum 4/5,5,4 (Fig. 8C). Prelabral setae smooth. Labral margin with 2+2 granules. Claw with long simple seta (Fig. 8D). Unguis slender with 2 inner teeth (Fig. 8D). Unguiculus lancet form, almost reaching to 1/3 of innerside of unguis (Fig. 8D). Ventral tube unscaled. Tenaculum quadridentated on swollen process, with one blunt median seta (Fig. 8E). Furca pale. Mn:Dn:Mc ratio as 25:26:0.1. Dens slender, crenulated on posterior side, with one prominent dorsal appendix (Fig. 8G). Mucro bidentated, with one basal seta (Fig. 8F).

Type data.—Holotype ♂, Sakaerat Research Station (Nakhon Ratchasima), at alt. 250 m, from fallen leaves on surface soil of dried stream in evergreen forest, 17.VI.95. Paratypes, ♂ ♀ 3, same data as holotype.

Etymology.—The name *minimus* means small size of this new species.

Remarks.—This species is related to *Lepidocyrtus (As.) cinctus* YOSII, 1981 from Sabah. But it is characterized by lateral patches of Th.III and Abd.I, and a transverse band on dorsal side of Abd. IV segment and a speck on vertex.

***Lepidocyrtus (Ascocyrtus) reductus* Park and Rojanavongse n.sp. (Fig. 9)**

Body length up to 2.0 mm. White color in alcohol. Body covered with hyaline, narrow scales. Body setae small. Thorax II segment protruded (Fig. 9A). Antenna covered with scales on dorsal side of Antenna I and II segments. Antenna 4-segmented, ratio as 2:3:3:4. Antenna III, IV segments gray color. Antenna IV segment with an apical lobe. Antenna:head ratio as 3:1. Eyes 8+8, with eye patch. Labrum 4/5,5,4, without any labral margin process (Fig. 9B). Maxillary ramus with simple setae on process (Fig. 9D). Trochanteral organ with ca. 34 setae (Fig. 9E). Claw with one tenent hair (Fig. 9F). Unguis with 2 inner teeth and one pair of lateral teeth (Fig. 9F). Unguiculus lancet form, almost reach to 4/5 of inner side of unguis (Fig. 9F). Ventral tube unscaled, with 1+1 macroseta on anterior side. Tenaculum quadridentate rami, with one median seta (Fig. 9G). Furca pale. Mn:Dn:Mc ratio as 5:4:0.3. Dens slender, crenulated on posterior side, with one prominent dorsal vesicle (Fig. 9I). Mucro bidentated, with one basal seta (Fig. 9H).

Type data.—Holotype ♀, Khao Yai National Park (Nakhon Ratchasima), from leaves near the waterfall Hae Suwat at alt. 620 m, in evergreen forest. 18.VIII.95. Paratypes 7, same data as holotype.

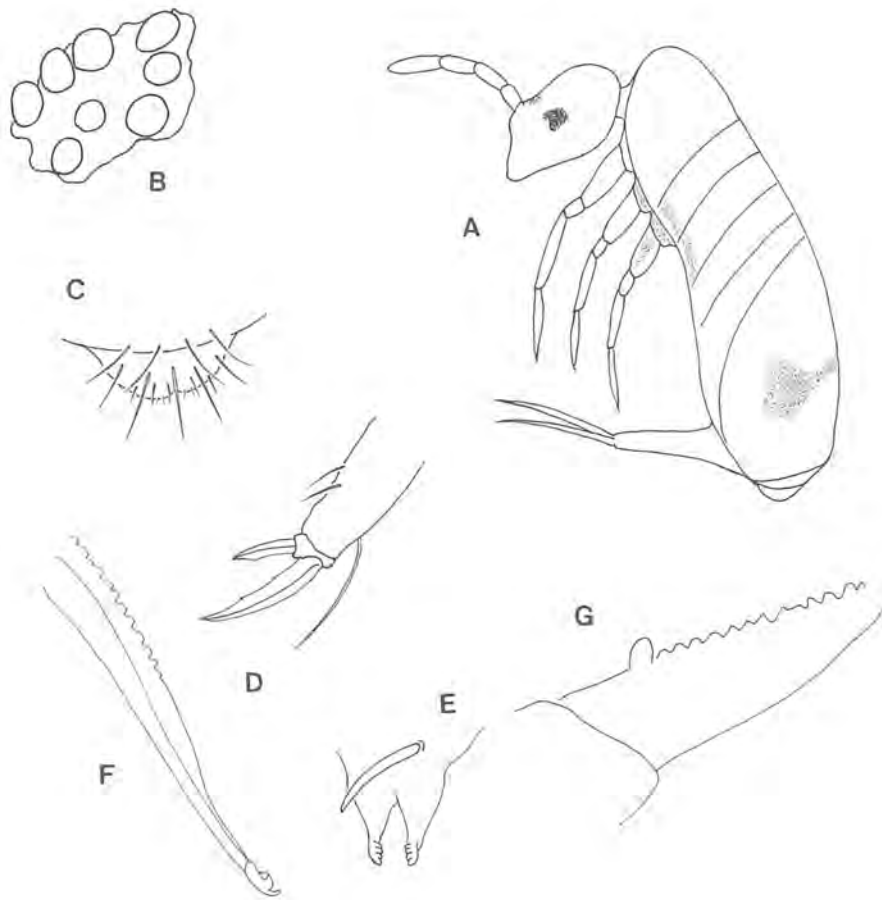


Figure 8. *Lepidocyrtus (Ascocyrtus) minimus* Park and Rojanavongse n. sp. A. habitus; B. eyes and eye patch; C. labrum; D. unguis and unguiculus; E. tenaculum; F. muero and proximal part of dens; G. dorsal vesicle of dens.

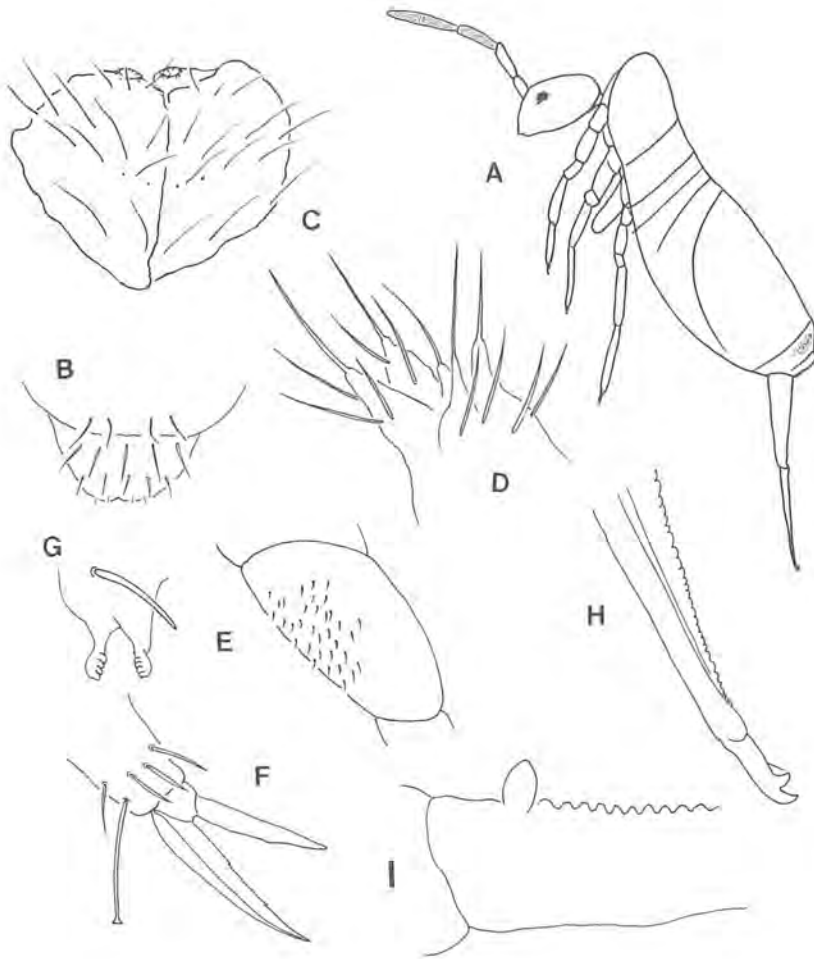


Figure 9. *Lepidocyrtus (Ascocyrtus) reductus* Park and Rojanavongse n. sp. A. habitus; B. labrum; C. labium; D. maxillary ramus; E. trochanteral organ; F. unguis and unguiculus; G. tenaculum; H. mucro and proximal part of dens; I. dorsal vesicle of dens.

Etymology.—The name *reductus* means reduced number of body setae in this new species.

Remarks.—This species is close to *L. (Ascocyrtus) medius* Schaffer, 1898. It is differentiated by the chaetotaxy of tergites and by its body pigmentation.

DISCUSSION

Prior to the present report, only one species of *Dicranocentroides* (Paronellidae) and 6 species of *Lepidocyrtus* (Entomobryidae) were known from Thailand. Paronellid members, however, have been found to be the dominant group of Collembola from tropical forests in Thailand, Malaysia and Indonesia, apparently more linked to various niches offered by the rich flora and heterogenous environmental conditions as well.

Paronellidae are restricted to tropical areas. By contrast, *Lepidocyrtus* spp. normally occur both in tropical and temperate forests which raises questions about how their adaptability might have arisen in terms of the genetics and ecology of this insect group.

We can expect that many additional species remain to be discovered from Thailand in view of high endemism of this group found in tropical forests. Further work on a long-term basis should be carried out to obtain an overall picture of the Collembolan fauna of Thailand, and to reveal its biogeographical patterns.

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